

## Putting Education First: The Wynn Nature Center

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**Abstract:** The purpose of this paper is to introduce the Center For Alaskan Coastal Studies and to focus on one of its centers: The Wynn Nature Center. This center was selected because the majority of visitors come from the local community. Furthermore, this center hosts numerous field trips from the local public schools. Students spend the day doing field research with the resident naturalists and their teacher. Because of the perceived value of teaching forest ecology to young adults, the potential value of building environmental awareness at a young age, and the exciting and innovative ways in which WNC works with these young learners, one such learning experience will be outlined in this paper.

### The Center for Alaskan Coastal Studies:

The Center for Alaskan Coastal Studies (CACS) was established in 1980 in Homer, Alaska. Homer is located on the Kenai Peninsula, which extends southwest of Anchorage. The CACS is a membership-based, 501-c-3 educational nonprofit organization focusing on environmental education in the Kachemak Bay. The mission statement at CACS is as stated below:

To foster responsible interaction with our natural surroundings, and to generate knowledge of the marine and coastal ecosystems of Kachemak Bay through environmental education and research programs.

In an effort to fulfill the mission statement, the CACS has defined three primary goals. Each of the CACS programs endeavors to promote:

- (1) Education: To increase the awareness and understanding of the coastal marine ecosystems by providing environmental education programs and field experience to students and the general public.
- (2) Stewardship: To be caretakers, and to motivate others to be caretakers of the Alaskan coastal and marine environments.
- (3) Research: To acquire data needed for making informed decisions on the use and

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sustainable development of Kachemak Bay resources, and to facilitate efforts by governmental, academic, and private research agencies.

The CACS owns and operates two remote field stations: Peterson Bay Field Station (PBFS) and the Carl E. Wynn Nature Center (WNC). Both sites are used to offer a variety of educational programs, ranging from daily self-guided tours, to guided interpretive hikes, to multi-day educational school programs.

#### **Visitor profile:**

In 1999, a total of 4317 people visited one of the CACS centers and participated in one of the programs offered. According to the 1999 report from the President of the board of directors, an estimated 1971 people participated in one of the PBFS programs, 1100 others participated in one of the WIN programs. There were an additional 1246 visitors who reportedly stopped by the headquarters to obtain information or to participate in special events offered at this location.

#### **The Wynn Nature Center:**

The Carl E. Wynn Nature Center is located on Skyline Drive, along the bluffs overlooking Homer and the Kachemak Bay. This property was acquired in 1990, bequeathed to the CACS by the Carl E. Wynn Foundation. It is comprised of 126 hilly acres, covered with spruce trees and featuring semi-alpine meadows and a variety of wildflowers and plants. Visitors to WNC tend to fall into one of two categories: (1) those who stop by for a self-guided or naturalist led, interpretive hike that focuses

on plant identification and the medicinal and historic uses of these plants, or (2) school groups that schedule visits to participate in ecology and other educational programs. The WNC has designed its school programs to interface with the general curriculum in the public schools. They have also developed and written a number of supportive materials, including handbooks, guidebooks and teacher's manuals. The center is open to the public and offers four guided tours a day during the season.

#### **Wynn Nature Center guidebooks:**

WNC has compiled a series of guidebooks, along with a teacher's guide. Each guidebook has a particular focus, as suggested by the following titles: *Wynn Nature Center: Forest Ecology*, *Wynn Nature Center Guide: Birds*, and *Wynn Nature Center Guide*. To help orient and guide teachers, WNC has also produced a teacher's handbook: *Wynn Nature Center: Teacher's Handbook*. All of these guides were compiled and edited by Daisy Lee Bitter, with the exception of *Wynn Nature Center Guide: Birds*, which was compiled by George West. According to Bitter (1997, p. ii), the purpose of this series is threefold: (1) to encourage teachers and other environmental learning groups to use WNC; (2) to provide ideas and sample lesson plans to encourage and maximize learning; and (3) to promote the use of WNC as a base for outdoor winter educational and recreational activities. Bitter hopes that this series of guidebooks will act as a set of tools to facilitate the study and enjoyment of the environment. In the *Teacher's Handbook*, Bitter acknowledges the many contributions, comments and suggestions from various people, but cites a few sources as being

special. Some of the sample lessons included in the guidebook series were borrowed and adapted from the following sources: (1) *Project Learning Tree Environmental Education Activity Guide, Pre K-8* (American Forest Foundation, 1993); (2) *Alaska Ecology, Alaska Wildlife Curriculum Teacher's Guide* (Alaska Department of Fish and Game); and (3) *The Role of Fire in Alaska* (US Fish and Wildlife Service).

Each of the WNC guides is printed on one side of the page only, inviting the reader to use the reverse side of each page for notes, sketches and suggestions. There is also a concise glossary of environmental terms at the end of the teacher's handbook, providing a useful reference. Finally, the editor decided to include in the teacher's book a list of the Alaska Student Performance Standards in Science. By adding these standards-- or "guidelines" as Bitter prefers to refer to them, it helps to refine the focus of each of the activities and lesson plans put forth in the WNC guidebooks. It also makes it easier for Alaskan State teachers to make connections between the materials and the Alaskan State standards for science. These standards (Bitter, 1997, pp. iv-vi) have been broken down into the following categories:

- (1) Content of Science
- (2) Science Inquiry
- (3) The Nature and History of Science
- (4) The Application of Science and Technology to Personal and Community Life

Each of these categories is further defined by listing a multitude of key elements describing the goals that teachers should teach towards. (See appendix for the

complete set of standards.)

### **Educating Children at WNC:**

On September 7, 2000, the author observed a group of twenty-two third graders, who came to the WNC Center to participate in a half-day ecology program. The following summary is based upon a transcription of the video footage that was taken on this occasion.

The students arrived at the WNC parking lot shortly after 12:30 on a bright, windy day. Stacy, the WNC naturalist, and Jill, the WNC naturalist intern were there to greet them when they arrived. The group of students were divided into two groups of equal size. Jill escorted one of the groups to the shelter adjacent to the WNC cabin. Stacy accompanied the other group of students to the shelter, where both groups joined together. Jill's group sat to the students' left, Stacy's to their right. There was much chatter among the children. The excitement of going on a field trip was apparent. Six parent aids came for the day to help out. One of the children was in a wheelchair.

Jill began the orientation by asking the children to raise their hands if they had been to the WNC Center before. One boy raised his hand. Stacy then asked how many of the children had ever heard of the WNC Center before. A number of boys and girls raised their hands.

Stacy introduced herself and then Jill. She told the children that they were the very first field trip of autumn 2000. A free exchange of questions and answers took place between the two naturalists and the children. Both Jill and Stacy seemed relaxed, poised and

comfortable working with children.

Stacy gave a brief introduction of the WNC facility, pointing out the cabin, the boardwalk (an 800 meter trail loop put in to allow for handicap access) and the trail. She explained that they were going to spend most of their time that day on the trail. She went on to explain that they would be doing some fun things in two separate groups and would then reunite to do certain activities as one group. As things turned out, the students would do the first activity as one big group, and then divide back into two groups for a series of other activities.

During a short restroom recess for the children, Stacy gave the teacher a copy of the three WNC nature guides and one teacher's handbook described earlier in this article. When the children reassembled, Jill introduced the theme of the day's lesson: "Habitat-Habitat". Jill gently reminded the children of a few rules: to keep their hands to themselves; to stay on the trail; and to leave the bark chips on the ground.

Jill then solicited information from the children. She asked what the word "habitat" meant. One boy said it is where we live on earth, and that bears have their own habitat. A girl added to this by saying that bears "do their own thing". This produced more comments from the children: bears eat; they go to sleep; they hibernate. Then a boy returned to the original question by volunteering that a habitat is just a place where an animal lives. Someone else added that bears climb trees. One boy said that he heard a song about habitats. While Jill led this discussion, Stacy characterized the comments by making simple drawings on a

flip chart. The pictures were simple and somewhat comical, but served the purpose of charting or mapping the discussion.

This open forum approach, where the children could freely contribute to and direct the course of discussion, would seem to be a very effective way of engaging the students and thematizing the day's lesson. Furthermore, the children were given the opportunity to explore their own knowledge and to formulate their own thoughts.

After establishing the fact that animals need water, food, shelter and space in order to live, the subject shifted to human beings. The children pointed out that we can get our water from the grocery store or from our well at home. Jill asked what else we needed to survive. The children responded by saying that we need food to survive. One girl added that we need bacon! The children continued by volunteering that we can find our food at the store, at a restaurant, and so on.

The bridge being built here was an important one-between humans and animals, between habitat and habitat. It was working towards the notion that we all living things have certain needs and requirements, and that we are dependent upon our habitat for survival. The focus today would be on animals and their habitats, but the association between human beings and their habitat was clearly an implied part of the lesson.

Both groups then moved down to the parking lot where they would play a game called, "Oh Moose". The parking lot was spacious and provided a safe, level area for the students to move around. It also served to reinforce the idea that habitats require space.

Stacy and Jill started to explain the rules of the game. Half of the group would form one line, the other half of the group would form another line. One line of students would be composed of moose, the other line of students would be composed of various habitat components (or resources). Both groups would stand in parallel lines facing each other, about 10 or 15 meters apart. The game would be a simulation of real life conditions, where the moose and habitat components would be in a constant state of flux.

Before playing the game, Stacy and Jill had to teach the children a few simple signs. These signs would be used to represent each of the parts the students would be asked to play: water, food, shelter and, of course, moose. The sign for water would be a wavy motion of the hand in front of the chest. The sign for food would be holding both hands in front of the mouth. Holding both arms over the head would indicate shelter. Both hands held on the head, branching up like antlers would represent a moose. Stacy and Jill then gave the children the opportunity to practice and review the signs to make sure that the signs were familiar to all.

This game would be played in rounds, each round representing one year. Before the start of each round, each moose (in the left line) had to secretly decide what habitat component it was going to look for. Each habitat component (in the right line) had to secretly decide which of the habitat components it was going to be. At the beginning of each round, all of the habitat components and the moose would make the appropriate gesture indicating what they were or (in the case of the moose) what they

were looking for. Each of the moose would have to successfully locate and retrieve one of each of the habitat components in order to survive.

The fact that signs changed every round was good in that it required everyone to constantly pay attention. Each moose had to search for whatever it needed to survive. This simulated the real world in which a moose would have to look for and find the various resources it required in order to survive.

At the start of each round, as signaled by Jill, all of the students would make the appropriate hand gesture to indicate what role they were going to play. Each moose would walk or run over to the habitat line in search of what it was looking for. If a moose were looking for food, for example, it would have both its hands over its mouth and would have to identify a habitat component with both of its hands over its mouth. If it found a match, it would escort the habitat component back to the moose line, where the habitat component would become another moose in the following round. This was meant to signify plentiful resources and reproduction. If a moose was unsuccessful in finding the habitat component that it was looking for, it would perish and remain in the habitat component line for the following round. This was intended to signify the concept of limiting environmental factors or dwindling resources. The moose would become food for another animal or would decompose into soil.

The game continued in this fashion, with each moose looking for required habitat components, while in competition with the

other moose and at the mercy of the habitat limitations. Round by round, Stacy would count the number of moose and write that number on a flip chart. After a few rounds, she began to graph the population changes among the moose. This would later provide the children with an ongoing graphic record of how the environment was changing.

In earlier rounds, the number of moose increased. Resources were plentiful; the moose multiplied. At one point in the game, there were 17 moose and only 4 habitat components remaining. After five or six rounds, however, it became apparent that the number of moose was beginning to decline. There were no longer enough habitat components to support the moose population.

Somewhat later, the children were invited to view the graph of the data from their game. This provided them with the opportunity to learn from what they were doing, to conceptualize the environment and (some of) the factors that influenced its balance. The graphed data provided a written record and gave the children the opportunity to reflect upon the game and what their actions meant; why the lines grew thicker or thinner; why the number of moose changed. The game was appealing because it was fun. More importantly, it provided the opportunity for the children to apply what they had learned during the orientation and to reflect upon the data collected during the game.

Sometime after this observation, the author discovered that "Oh Moose" appears in the Teacher's Handbook (pp. 30-33). Apparently, this activity has been adapted from a simulation entitled, "Oh Deer", which was developed by the Western Regional

Environmental Education Council, (Bitter, p. 32). The teacher's handbook explains "Oh Moose" in a clear step by step fashion. It identifies the suggested grade levels, subjects to be drawn from, duration of play, group size, setting and vocabulary. It goes on to list objectives, teaching strategies, materials, and background information. Perhaps the most useful section can be found at the end, where there are a number of ideas given for possible extensions and ways in which to evaluate what the students learned from the lesson. Finally, there are multiple resources listed, directing teachers to various sources of supplementary information.

**Other activities observed on the same day:** The rest of the day was spent with the students divided into two groups. What follows is a brief description of the activities observed, to offer a more comprehensive view of the way the students were challenged and engaged on this day.

Working with a group of ten students in a clearing near the cabin, Jill distributed a natural resource card to each of the students. These cards were worn like necklaces, each card representing a particular resource in the environment. Jill then loosely attached a long piece of yarn to each of the students. This linked them together as one unit or system, signifying the inter-related network of resources found in nature. If one of the students were to move, this action would gently tug upon each of the other students—symbolizing the effect of one resource (change) upon another. This activity seemed to engage the students in a meaningful way, as it demonstrated the inter-connectivity of natural resources in the environment. It also pointed out the importance of maintaining a

balance in nature.

At the same time, on the back portion of the trail, Stacy was working with a group of eleven students. Her group was focusing on a microscopic portion of the environment. Each of the students was examining a small area, measurable in inches. This microscopic view encouraged the students to look for details that they ordinarily would not notice. Each of the students was encouraged to describe what they saw. This seemed to be a very valuable exercise in encouraging students to pay attention to detail as well as encouraging them to see the larger picture. It also gave students the chance to speak about what they saw—not simply what was pointed out to them.

Back at the trail head, Jill was preparing her group for another activity. Students were put into pairs. Each pair was given a plastic laminated resource card, referring to some natural resource found along the trail. Each card contained a description of the resource, along with a picture. Jill took one pair of students to the first station along the trail and helped them read through their resource card. Each of the two "teachers" would take turns reading the information on the card, while the next pair of (visiting) students listened to what was read. The first pair of students had a card describing willows (a moose's favorite food). They took turns reading the card to the visiting students and then showed them real willows in the area where they were standing. After listening to the explanation, the two visiting students moved on to the next station, where they would become the teachers for the next pair of students to come along.

This progressed up until the last pair of students visited the fourth station. At this point, the first teachers (manning station one) would become the next pair of visiting students to proceed along the trail, stopping to listen and learn at stations 2, 3, and 4. The first pair would then become teachers again, at station 5. This moving loop of students continued in the same fashion, with one pair of students taking the responsibility of teaching another pair of students, thus the name: "Each One, Teach One".

This activity would seem to be very effective in encouraging students to take the responsibility of teaching or sharing something they have learned with other students. It also encouraged the visiting students to listen to and learn from another student. Once again, this activity was student-orientated and led by the students. Jill stood by ready to help out when necessary.

Somewhere in the middle of the trail, Stacy was working on another activity with her group of students. Stacy asked the students if they knew what "flash" photography was. Long since out of date, it was surprising that one boy knew what it was and could explain it clearly. The use of this example was to encourage the students to think of a camera that could only take one picture per flash, that each picture would be relatively expensive, and that photos should be taken very selectively. The group was divided into pairs and then walked further along the trail until they came to a clearing in the woods. Each pair of students consisted of a photographer and a "camera". The photographer would manipulate the camera (with eyes held shut) to a point where the

photographer wanted to snap a picture. The photographer would then "shoot" a photo by asking the camera to open his or her eyes. This seemed to serve a dual purpose. It not only encouraged the photographer to be selective about what to shoot, but it gave the camera (or student) the opportunity to see things from someone else's point of view. This (virtual) photography activity would seem to be a meaningful way of developing perceptual awareness. Not only did the camera learn to see things from the photographer's point of view, but the photographer could also learn from hearing about what it was that the camera actual saw.

Stacy and Jill's groups, starting from opposite ends of the trail, eventually met up near the midway point. They joined together on their way to a vista point along the boarded section of the trail. They would discuss what they had learned that day and how they felt about what they learned. This student forum was well intentioned, but by this time some of the students were noticeably restless. What was remarkable was that the students (third graders!) managed to stay actively engaged over a period of several hours. What a wonderful way to begin the school year.

#### **Concluding remarks:**

The various examples of ecology based activities observed by the author left a sense of wonderment about how the students could have been so actively and so thoroughly engaged in learning. There would seem to be a number of possible explanations for this.

The guides had a certain commitment and passion for their job, which was evident to the author and probably to the students as

well. The group was relatively small and was accompanied by six parent volunteers for the day. While the parent aids were not actively involved in guiding the students' learning process, their presence offered emotional support to the children. The students' teacher provided similar support, and she presumably offered follow-up lessons back in the classroom. She would ultimately be responsible for meshing this learning experience with other things that the children were learning at school.

The most important factors, though, seemed to be the materials used and the teaching or guiding methods. As described in the previous section, the materials were well conceived, well motivated and well written. They focused on the process of discovery and wonderment. The materials were intriguing, they drew students in, they captured their attention. Furthermore, the materials were student-centered and encouraged students to be autonomous, to take control of their learning. The materials were varied and thought provoking, yet they were all game-like in nature. This was a big plus, particularly with such young learners. The "fun" element was motivating in itself, and undoubtedly played a role in keeping the students interested.

Of equal or greater importance were the naturalist guides. They were successful in using the materials as the materials were intended to be used. Explanations were kept to a minimum, in favor of giving center stage to the students. The most important role the guides played was probably in inspiring the students to be curious, to express what they thought, and what they felt about what they thought. This was important because it



helped to personalize the learning experience. The students' thoughts were considered important and made the students feel important, too.

As a result of the support of the teacher and parents, the commitment and passion of the guides, and the engaging materials, the students observed on this day all seemed to leave the WNC Center enriched by the day's experience. The value of giving young children this type of learning opportunity cannot be understated. Building ecological or environmental awareness starts by developing an interest. This interest is fueled by knowledge and by a sense of responsibility and commitment. Most importantly, though, the learner must feel a part of the process. This is why discovery and wonderment are so important. This helps students see themselves as part of what they are learning about. It makes the learning process more relevant, more meaningful, more real. While one cannot say to what extent the day's experience will influence the development of environmental awareness in these young learners, It is likely to have a positive impact. If the seeds planted today are cultivated and continue to grow, these children stand a better chance of growing up to become environmentally conscious citizens.

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## References:

- Bitter, Daisy Lee. (1997). *Wynn Nature Center Guide: Animals*. Homer, USA: The Center for Alaskan Coastal Studies.
- (1997). *Wynn Nature Center: Teacher's Handbook*. Homer, USA: The Center for Alaskan Coastal Studies.
- (1998). *Wynn Nature Center: Forest Ecology*. Homer, USA: The Center for Alaskan Coastal Studies.
- Center for Alaskan Coastal Studies (2000).  
<<http://www.akcoastalstudies.org/orgnize.html>>
- Center for Alaskan Coastal Studies (1999). Annual Report 1999. Center for Alaskan Coastal Studies, Inc. Homer, Alaska, USA
- Cunningham, Paul (2000). *Environmental Education: The Center for Alaskan Coastal Studies*. Rikkyo University Bulletin of Studies in Tourism, (3), 23-34.
- McLaren, D. (1998). *Rethinking tourism and ecotravel: The paving of paradise and what you can do to stop it*. Connecticut, USA: Kumarian Press.
- Western Regional Environmental Education Council. (1982, 1985, 1992). *Oh Dear! Project WILD*. Bethesda, Maryland: Western Regional Environmental Council.
- West, George C. (1997). *Wynn Nature Center Guide: Birds*. Homer, USA: The Center for Alaskan Coastal Studies.

## Appendix: Alaska (2000) Student Performance Standards in Science

### Science Performance Standard A: **CONTENT OF SCIENCE<sup>1</sup>**

All Alaska students will understand scientific facts, concepts, principles and theories. (Key elements appear in the heading<sup>2</sup> for each item.) Students who meet this standard will:

- (1) **Structure of Matter.** Understand the models describing the nature of molecules, atoms and sub-atomic particles, and their relation to the structure and atoms and sub-atomic particles, and their relation to the structure and behavior of matter.
- (2) **Changes and Interactions of Matter.** Know about the physical, chemical and nuclear changes and interactions that result in observable changes in the properties of matter.
- (3) **Universe.** Understand the models describing composition, age and size of our universe, galaxy and solar system. Know

that our universe is constantly moving and changing.

(4) **Earth.** Understand observable natural events such as tides, weather, seasons and moon phases in terms of the structure and motion of the earth.

(5) **Forces of Nature.** Understand the strength and effects of forces such as gravity and electromagnetic radiation.

(6) **Motion.** Understand that natural forces cause different types of motion. Describe the relationship of these forces and changes in motion.

(7) **Processes that Shape the Earth.** Understand how the earth changes because of plate tectonics, earthquakes, volcanoes, erosion and deposition, and living things.

(8) **Energy Transformations.** Understand the scientific principles and models that: (a) describe the nature of physical, chemical and nuclear reactions; (b) state that whenever energy is reduced in one place, it is increased somewhere else by the same amount; (c) state that whenever there is a transformation of energy, some is spent in ways that make it unavailable for use.

(9) **Flow of Matter and Energy.** Know about the transfers and transformations of matter and energy that link living things and their physical environment from molecules to ecosystems.

(10) **Cells.** Know that living things are made up mostly of cells and that all life processes occur in these basic units.

(11) **Heredity.** Know that similar features are passed on by genes through reproduction.

(12) **Diversity.** Distinguish the patterns of similarity and differences in the living world in order to understand the diversity of life. Understand the theories that describe the importance of diversity for species and ecosystems.

(13) **Evolution and Natural Selection.** Understand the theory of natural selection as an explanation for evidence of changes in life forms over time.

(14) **Interdependence.** Understand the interdependence between living things and their environment. Know that the living environment consists of individuals, populations and communities. Recognize that a small change in a part of the environment may affect the whole.

(15) **Local Knowledge.** Use science to understand and describe the local environment.

(16) **Relativity.** Understand basic concepts about the theory of relativity that changed our view of the universe by uniting matter and energy and linking time with space.

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<sup>1</sup> These standards appear in Bitter (1997, pp. iv-vi). Perhaps these (2000) guidelines were inserted at a later date, or written in advance of the academic year, 2000.

<sup>2</sup> Headings have been added to sections B, C, and D in an effort to better characterize each of the items. Some of the headings have been modified by the author for the sake of clarity. All headings appear in boldface type.

## **Science Performance Standard B:** **SCIENTIFIC INQUIRY**

All Alaska students will understand and develop the skills of scientific inquiry. Students who meet this standard will:

(1) **Scientific Processes.** Use the processes of science, including observing, classifying, measuring, interpreting data, inferring, communicating, controlling variables, developing models of theories, hypothesizing, predicting and experimenting.

(2) **Scientific Investigation.** Design and carry out scientific investigations using appropriate instruments.

(3) **Paths of Scientific Inquiry.** Understand that scientific inquiry often involves different ways of thinking, curiosity and the exploration of multiple paths.

(4) **Nature of Scientific Inquiry.** Understand that personal integrity, skepticism, openness to new ideas, creativity, collaborative effort and logical reasoning are all aspects of scientific inquiry.

(5) **Ethical Standards.** Employ ethical standards, such as unbiased data collection and factual reporting of results.

(6) **Safety Procedures.** Employ strict adherence to safety procedures in conducting scientific investigations.

### **Science Performance Standard C: THE NATURE AND HISTORY OF SCIENCE**

All Alaska students will recognize that the content and conduct of science are influenced by the historical, social, cultural and environmental contexts in which they occur. Students who meet this standard will:

- (1) **Scientific Community.** Understand how the terms fact, observation, concept, principle, law and theory are generally used in the scientific community.
- (2) **Scientific Validation.** Know that scientific knowledge is validated by repeating specific experiments which may conclude in similar results.
- (3) **Environmental Influences.** Understand that society, culture, history and environment affect the development of scientific knowledge.
- (4) **Personal and Societal Beliefs.** Understand that some personal and societal beliefs accept non-scientific methods for validating knowledge.
- (5) **Sharing Scientific Discourse.** Know that sharing of scientific discoveries is important in influencing individuals and society and in advancing scientific knowledge.
- (6) **Scientific Discovery.** Understand that scientific discovery is often a combination of an accidental happening and observation by a knowledgeable person with an open mind.
- (7) **Multidisciplinary Discovery.** Understand that major scientific "breakthroughs" link large amounts of knowledge, often building upon the contributions of many scientists and crossing different lines of study.

- (8) **Supporting Evidence.** Understand that acceptance of a new idea depends upon supporting evidence and that new ideas that conflict with beliefs or common sense are often resisted.

### **Science Performance Standard D: APPLICATION OF SCIENCE AND TECHNOLOGY TO PERSONAL AND COMMUNITY LIFE**

All Alaska students will apply scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations. Students who meet this standard will:

- (1) **Application of Scientific Knowledge.** Apply scientific knowledge and skill to understand issues and everyday events.
- (2) **Impact of Scientific Innovations.** Understand that scientific innovations may affect our economy, safety, environment, health and society. These effects may be long or short term, positive or negative, expected or unexpected.
- (3) **Scientific Solutions.** Recommend solutions to everyday problems by applying scientific skills and knowledge.
- (4) **Scientific Evaluation.** Evaluate the scientific and social merits of solutions to everyday problems.
- (5) **Scientific Discussion.** Participate in reasoned discussion of public policy about scientific innovations and proposed technological solutions to problems.
- (6) **Decisive Action.** Act on reasoned decisions and evaluate the effectiveness of actions taken.